① $\frac{7\sqrt{3}}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{7\cdot\sqrt{21}}{\sqrt{49}} = \frac{7\sqrt{21}}{7} = \sqrt{21}$

② $\sqrt{\frac{5}{12}} = \frac{\sqrt{5}}{\sqrt{4}\sqrt{3}} = \frac{\sqrt{5}}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{15}}{2\cdot 3} = \frac{\sqrt{15}}{6}$

③ $\frac{3}{\sqrt{27x}} = \frac{3}{\sqrt{9}\sqrt{3x}} = \frac{\cancel{3}1}{\cancel{3}\sqrt{3x}} \cdot \frac{\sqrt{3x}}{\sqrt{3x}} = \frac{\sqrt{3x}}{\sqrt{9x^2}} = \frac{\sqrt{3x}}{3x}$

④ $(\sqrt{x+7})^2 = (x+5)^2$ Check my answers

$(x+5)(x+5) = x^2+5x+5x+25$

$x+7 = x^2+10x+25$
$-x \quad -7 \quad\quad -x \quad -7$

$0 = x^2+9x+18$

$0 = (x+6)(x+3)$

$x+6=0$ $\quad x=-6$

$x+3=0$ $\quad x=-3$

$x=-3$

Check
If $x=-6$

$\sqrt{-6+7} \stackrel{?}{=} -6+5$

$1 \neq -1 \quad x \neq -6$

If $x=-3$

$\sqrt{x+7} = x+5$

$\sqrt{-3+7} \stackrel{?}{=} -3+5$

$2 = 2$ ✓

⑤ $\sqrt[3]{2x-3} - 1 = 2$

$(\sqrt[3]{2x-3})^3 = (3)^3$

$2x-3 = 27$

$2x = 30$

$x = 15$

$\sqrt[3]{2(15)-3} - 1 \stackrel{?}{=} 2$

$\sqrt[3]{27} - 1$

$3 - 1 = 2$

⑥ $\sqrt{x+5} = 1+\sqrt{x}$

$(\sqrt{x+5})^2 = (1+\sqrt{x})^2$

$(1+\sqrt{x})(1+\sqrt{x})$

$1+\sqrt{x}+\sqrt{x}+x$

$x+5 = 1+2\sqrt{x}+x$

$-x \quad -1 \quad -1 \quad -x$

$\frac{4}{2} = \frac{2\sqrt{x}}{2}$

$(2)^2 = (\sqrt{x})^2$

$4 = x$

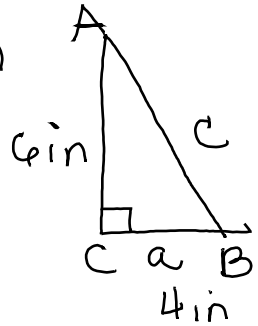
Check if $x=4$

$\sqrt{4+5} \stackrel{?}{=} 1+\sqrt{4}$

$\sqrt{9} \stackrel{?}{=} 1+2$

$3 = 3$ ✓

⑦



$a^2+b^2=c^2$

$(4)^2+(6)^2=c^2$

$16+36=c^2$

$52=c^2$

$\sqrt{4\cdot 13}=\sqrt{c^2}$

$2\sqrt{13}\text{ in} = c$

7.21 in.

⑧ $\sqrt{-64} = \sqrt{-1}\sqrt{64}$

$\sqrt{-1} = i \qquad i\cdot 8$

8i

⑨ $\sqrt{-12}\sqrt{-3} = i\sqrt{12}\cdot i\sqrt{3} = i^2\sqrt{36} = (-1)6 = -6$

⑩ $\frac{\sqrt{-16}}{\sqrt{4}} = \frac{i\sqrt{16}}{\sqrt{4}} = \frac{i\cdot 4}{2\cdot 1} = 2i$

(11) $(-2+4i)(5-6i)$ FOIL

$-10 + 12i + 20i - 24i^2$

$-10 + 32i - 24(-1)$

$-10 + 32i + 24 =$ $14 + 32i$

(12) $\frac{-3+2i}{1-i} \cdot \frac{1+i}{1+i} = \frac{-3-3i+2i+2i^2}{1^2-i^2} =$ $(-1)^2$

$1-(-1)$

2

$\frac{-3-i-2}{2} = \frac{-5-1i}{2} =$ $-\frac{5}{2} - \frac{1}{2}i$

$a+bi$

(13) $(7+5i) - 1(3-4i)$

$7+5i \quad -3+4i =$ $4+9i$

(14) $(3+4i)^2 = 9+24i+16i^2 = 9+24i+16(-1)$

$(a+b)^2 = a^2+2ab+b^2$

$9+24i-16$

$-7+24i$

(15) $2x^2-40=0$

$2x^2 = 40$

$x^2 = 20$

Take sq root

$x = \pm\sqrt{20}$ or $x = \pm\sqrt{4 \cdot 5}$

$x = \pm 2\sqrt{5}$

$x = 2\sqrt{5}$

$x = -2\sqrt{5}$

$x^2 = k$

$x = \pm\sqrt{k}$

(16) $\rightarrow (x+7)^2 = -49$

Use sq root prop

$x+7 = \pm\sqrt{-49}$

$\rightarrow x+7 = \pm 7i$

$-7 \quad -7$

$x = -7 \pm 7i \Rightarrow x = -7+7i$ or $x = -7-7i$ ←

(17) $x^2+8x+16 = 2+16$ $\quad \left(\frac{b}{2}\right)^2 = \left(\frac{8}{2}\right)^2 = 16$

$(x+4)^2 = 18$

Use sq root prop

$x+4 = \pm\sqrt{18}$ or $\pm 3\sqrt{2}$

$\sqrt{9\cdot 2}$

$x+4 = \pm 3\sqrt{2}$

$-4 \quad -4$

$x = -4 \pm 3\sqrt{2} \rightarrow$ $x = -4+3\sqrt{2}$ or $-4-3\sqrt{2}$

(18) $x^2-2x+10 = 0$

$-10 \quad -10$

$x^2-2x+1 = -10+1$ $\quad \left(\frac{b}{2}\right)^2 = \left(\frac{2}{2}\right)^2 = 1$

$(x-1)^2 = -9$

Use sq root prop

$x-1 = \pm\sqrt{-9}$ or $\pm 3i$

$x-1 = \pm 3i$

$+1 \quad +1$

$x = 1 \pm 3i \rightarrow 1+3i$ or $1-3i$

(19) $ax^2+bx+c=0$ $\quad x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$

$9x^2-10x+2=0$

$a=9,\ b=-10\ \ c=2$ $\quad x=\dfrac{-(-10)\pm\sqrt{(-10)^2-4(9)(2)}}{2(9)}$

$x=\dfrac{10\pm\sqrt{100-72}}{18}$

$=\dfrac{10\pm\sqrt{28}}{18}=\dfrac{10\pm2\sqrt{7}}{18}$ or $\dfrac{\cancel{2}^{1}(5\pm\sqrt{7})}{\cancel{18}\ 9}$ ←

$x=\dfrac{5+\sqrt{7}}{9}$ or $x=\dfrac{5-\sqrt{7}}{9}$

(20) $x^2+2x+17=0$ $\quad a=1,\ b=2\ \ c=17$

$x=\dfrac{-2\pm\sqrt{(2)^2-4(1)(17)}}{2(1)}=\dfrac{-2\pm\sqrt{4-68}}{2}$

$x=\dfrac{-2\pm\sqrt{-64}}{2}$ or $\dfrac{-2\pm8i}{2}$ or $\dfrac{\cancel{2}^{1}(-1\pm4i)}{\cancel{2}\ 1}$

$x=-1+4i$ $\quad x=-1-4i$

(21) $x^2+20=7x$

$-7x\quad -7x$

$x^2-7x+20=0$ $\quad a=1\ \ b=-7\ \ c=20$

$x=\dfrac{-(-7)\pm\sqrt{(-7)^2-4(1)(20)}}{2(1)}$

$x=\dfrac{7\pm\sqrt{49-80}}{2}=\dfrac{7\pm\sqrt{-31}}{2}=\dfrac{7\pm i\sqrt{31}}{2}$ ←

$x = \frac{7}{2} + \frac{\sqrt{31}}{2}i$ or $x = \frac{7}{2} - \frac{\sqrt{31}}{2}i$

(22) $4x^4 - 5x^2 + 1 = 0$ $\quad x^4, x^2 \rightarrow \frac{4}{2}$ or $\frac{2}{1}$

Let $m = x^2$ ←

$m^2 = x^4$

$\rightarrow 4m^2 - 5m + 1 = 0$

$(4m - 1)(m - 1) = 0$

$4m - 1 = 0$ $\quad 4m = 1$ $\quad m = \frac{1}{4}$ $\quad x^2 = \frac{1}{4}$ $\quad x = \pm\frac{1}{2}$

$m - 1 = 0$ $\quad m = 1$ ← $\quad x^2 = 1$ $\quad x = \pm 1$

$x = \frac{1}{2}, -\frac{1}{2}, 1, -1$

(23) $x + 7\sqrt{x} - 8 = 0$

$-x \qquad +8 \quad -x + 8$

$(7\sqrt{x})^2 = (-x + 8)^2$ (ck) $\quad (a+b)^2 = a^2 + 2ab + b^2$

$m = \sqrt{x}$

$m^2 = x$

$49x = x^2 - 16x + 64$

$-49x \qquad -49x$

$0 = x^2 - 65x + 64$ ←

$0 = (x - 64)(x - 1)$

$x - 64 = 0$ $\quad x = 64$ $\quad x - 1 = 0$ $\quad x = 1$

If $x = 1$ ← $\quad 1 + 7\sqrt{1} - 8 \stackrel{?}{=} 0$ $\quad 1 + 7 - 8 = 0$

If $x = 64$, $\quad 64 + 7\sqrt{64} - 8 \stackrel{?}{=} 0$

$64 + 7 \cdot 8 - 8 \stackrel{?}{=} 0$

(24) $2x^{2/3} - 3x^{1/3} + 1 = 0$ $\quad x^{2/3}$

$x^{1/3}$ $\quad \frac{2/3}{1/3} = \frac{2}{1}$

$\rightarrow m = x^{1/3}$

$m^2 = x^{2/3}$

$\rightarrow 2m^2 - 3m + 1 = 0$

$(2m-1)\ (m-1) = 0$

$2m - 1 = 0$ $\quad m - 1 = 0$

$2m = 1$ $\quad m = 1$

$m = 1/2$

$(m)^3 = (x^{1/3})^3 = (1)^3$

$(m)^3 = (1/2)^3 = (x^{1/3})^3$ $\quad m^3 = x = 1$

$m^3 = \frac{1}{8} = x$ $\quad x = 1$

(25) $2x - 1 = x^2$

$-2x+1 \quad -2x+1$

$0 = x^2 - 2x + 1$

$0 = (x-1)(x-1)$

$x - 1 = 0$ $\quad x = 1$

(26) $\frac{2}{x-1} - \frac{3}{x+1} = 1$ $\quad$ LCD $(x-1)(x+1)$

$(x-1)(x+1)\ \frac{2}{(x-1)} - (x-1)(x+1)\left(\frac{3}{x+1}\right) = (x-1)(x+1)(1)$

$$\frac{2}{(x-1)} - \frac{3}{(x+1)} = x^2-1$$

$$2x+2-3x+3 = x^2-1$$

$$-x+5 = x^2-1$$
$$+x-5 \qquad -5+x$$

$$0 = x^2+x-6$$

x	+
-6	+1

$$0 = (x+3)(x-2) \leftarrow$$

$x+3=0$ $\quad x=-3$ $\qquad$ $x-2=0$ $\quad x=2$ $\qquad$ $x\neq 1,\ x=-1$

(27) $(2x-1)^2 - 6(2x-1)^1 + 5 = 0$

$m = 2x-1 \leftarrow$

$m^2 = (2x-1)^2$

$m^2 - 6m + 5 = 0$

$(m-5)(m-1) = 0$

$m-5=0$ $\quad m=5$ $\qquad$ $m-1=0$ $\quad m=1$

$2x-1=5$ $\quad 2x=6$ $\quad x=3$

$2x-1=1$ $\quad 2x=2$ $\quad x=1$

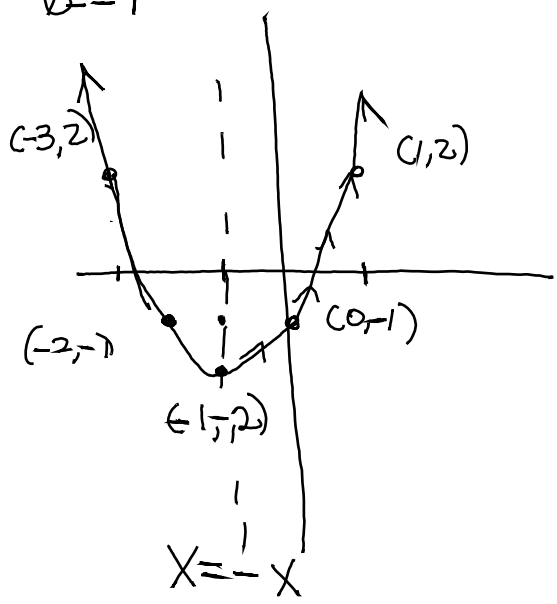
(28) $f(x) = (x+1)^2 - 2$ ←

$x+1=0$

$x=-1$

Vertex $(-1,-2)$

x	$(x+1)^2-2$	y
-3	$(-3+1)^2-2$	2
-2	$(-2+1)^2-2$	-1
-1	$(-1+1)^2-2$	-2 ←
0	$(0+1)^2-2$	-1
1	$(1+1)^2-2$	2



Domain $(-\infty, \infty)$

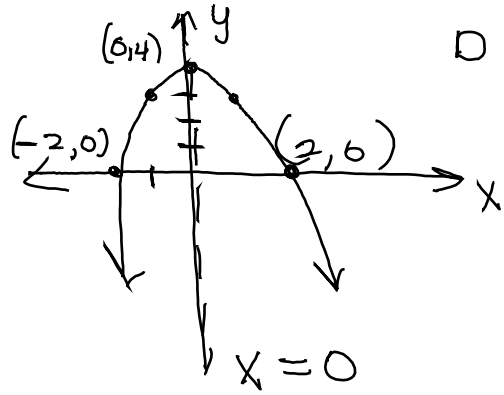
Range $[-2, \infty)$

(29) $f(x) = 4 - x^2$ or ax^2+bx+c

$= -x^2 + 4$ ↓ ↶↷

x at vertex $-b/2a = \frac{0}{2(-1)} = 0$ $y = 4$

x	$4-x^2$	y
-2	$4-(2)^2$	0
-1	$4-(-1)^2$	3
0	$4-0$	4 ←
1	$4-(1)^2$	3
2	$4-2^2$	0



D: $(-\infty, \infty)$

R: $(-\infty, 4]$

(30) $f(x) = -x^2 - 4x + 5$

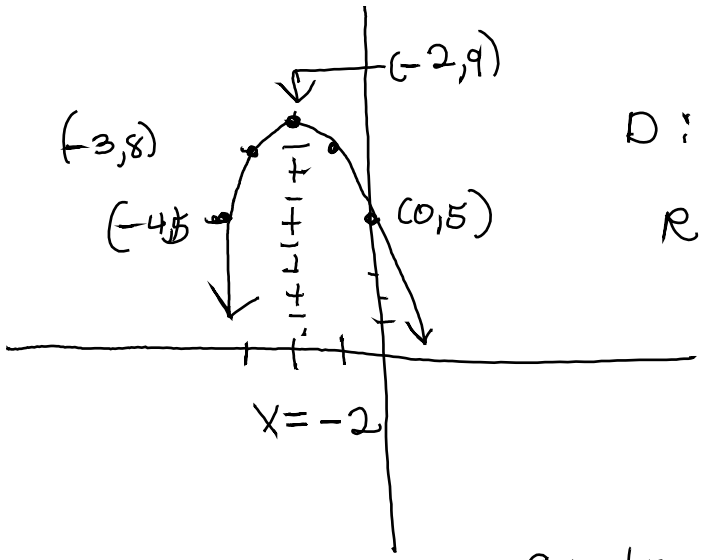
$a<0$ $x = \frac{-b}{2a} = \frac{+4}{-2} = -2$

Vertex $(-2, 9)$

$f(-2) = -(-2)^2 - 4(-2) + 5$

$-4 + 8 + 5 = 9$

x	$-(x^2)-4x+5$	y	y
-4			5
-3	$-(-3)^2-4(-3)+5 \rightarrow -9+12+5$		8
$\rightarrow -2$		9	
-1	$-(-1)^2-4(-1)+5 \rightarrow -1+4+5$		9
			8
0	$-(0)^2-4(0)+5$		5



D: $(-\infty, \infty)$

R: $(-\infty, 9]$

complete Sq. quadratic formula $\sqrt{-1} = i$

$i^2 = -1$